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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
09/770,486	01/29/2001	Ronald J. Kelley	CM01465L	6842

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EXAMINER

WILKINS III, HARRY D

ART UNIT PAPER NUMBER

1742

DATE MAILED: 09/16/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/770,486

Applicant(s)

KELLEY ET AL.

Examiner

Harry D Wilkins, III

Art Unit

1742

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --
Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 29 July 2004.
- 2a) ☐ This action is **FINAL**. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 1,3,6-17 and 19-21 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 1,3,6-17 and 19-21 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on 29 January 2001 is/are: a) ☒ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449 or PTO/SB/08)
Paper No(s)/Mail Date _____
- 4) ☐ Interview Summary (PTO-413)
Paper No(s)/Mail Date. _____
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other: _____

DETAILED ACTION

1. Applicant's request for reconsideration of the finality of the rejection of the last Office action is persuasive and, therefore, the finality of that action is withdrawn.
2. The rejection grounds for claim 21 have been withdrawn and new rejection grounds presented in view of Billings (US 4,108,605).

Claim Rejections - 35 USC § 103

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1, 3, 6, 8, 9, 14, 15, 17, 19 and 20 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teitel (US 4,211,537) in view of Appleby (US 5,813,222).

Teitel teaches (see fig. 3, abstract and col. 3, lines 25-31) a fuel cell hydride storage reservoir (92) for recharging a fuel cell. Hydrogen is moved into the reservoir (92) from a source. The fuel cell hydride storage reservoir (92) stores the hydrogen as metal hydrides. Teitel teaches storing the hydrogen in microcapsules (94) in tank (88). Teitel teaches (see abstract and col. 10, lines 25-31) that the storage reservoir was provided with heat exchanging means to heat/cool the reservoir and that in order to use the previously absorbed hydrogen the metal hydride would have been heated (i.e.-prior to transfer of hydrogen). During transfer of hydrogen into the reservoir, Teitel teaches (see col. 10, lines 48-57) that cooling the reservoir causes absorption of the hydrogen

gas. The heat exchanger of Teitel was capable of performing all of the claimed operations.

Thus, Teitel does not teach that the hydrogen is produced by an apparatus including an electrolyzer, a dryer and accumulator.

Appleby teaches (see abstract, figure 1, col. 6, lines 4-30 and col. 7, lines 52-61) an apparatus for producing hydrogen that includes an electrolyzer (50) for producing hydrogen and oxygen from water with the electrolyzer connected to a water supply (48) for on-board formation of hydrogen. The hydrogen gas is then passed through a dryer (liquid water trap 86) to remove any water and then the hydrogen is passed into an accumulator (52) for storage.

Therefore, it would have been obvious to one of ordinary skill in the art to have attached the hydrogen production apparatus of Appleby to the recharging apparatus of Teitel because the hydrogen production apparatus of Appleby provides a clean, dry and continuous source of hydrogen from only water, which would increase the safety of the system of Teitel due to the method of storing hydrogen on-board as water and not in the microcapsules (94).

Regarding the process limitation that "upon detection of the hear removal from the fuel cell hydride storage reservoir, the stored hydrogen gas is rapidly transferred from the hydrogen gas accumulator to the hydride storage reservoir", it is not further limiting on the apparatus claim because the above limitation deals with the manner or method of use of the claimed apparatus. It has been well settled that the manner or method of use of an apparatus cannot be relied upon to further limit claims to the

apparatus itself. See *In re Casey*, 152 USPQ 235, and MPEP 2114. However, Teitel teaches (see col. 10, lines 48-57) that the hydrogen is transferred after cooling the hydride storage reservoir by opening a valve, thus teaching the method of "rapidly transferr[ing] [hydrogen] from the accumulator to the hydride storage reservoir".

Regarding claim 3, it would have been within the expected skill of a routineer in the art to have added a pump to evacuate the reservoir to ensure that all of the gas in the reservoir had been removed.

Regarding claim 6, Appleby teaches (see col. 6, lines 13-15) a vent (port 54) for venting oxygen to the atmosphere. Therefore, it would have been obvious to one of ordinary skill in the art to have added an oxygen vent as taught by Appleby for venting oxygen to the atmosphere, thereby avoiding dangerous accumulation of oxygen gas. Appleby teaches that the vent is located on the water reservoir, not the electrolyzer. However, it would have been within the expected skill of a routineer in the art to have located the oxygen vent on the electrolyzer instead of the water reservoir. See MPEP 2144.04. VI. C. Shifting the position of the vent would not affect the operation of the system.

Regarding claim 8, it would have been within the expected skill of a routineer in the art to have added means for measuring the amount of hydrogen transferred because that would allow the operator to know how much hydrogen had been transferred allowing for more accurate calculation of data, i.e.-amount absorbed by metal hydride, amount discharged by metal hydride, total efficiency of system based on consumption of hydrogen, etc.

Regarding claim 9, though Appleby is silent as to the actual size of the system, it would have been within the expected skill of a routineer in the art to have scaled the size of the system to any desired size, such as one cubic foot or less as claimed. See MPEP 2144.04. IV. A. The size of the system would not affect the operation of its components.

Regarding claim 14, Teitel in view of Appleby teach a system including a water supply connected to an electrolyzer to hydrolyze water into hydrogen and oxygen, a hydrogen accumulator, a heat exchanger coupled to the fuel cell hydride storage reservoir and a fuel cell hydride storage reservoir to be refilled as claimed. Regarding the limitation that the stored hydrogen gas is “rapidly transferred from the accumulator to the hydride storage reservoir”, this is a method limitation. The above limitation is not further limiting on the apparatus claim because the above limitation deals with the manner or method of use of the claimed apparatus. It has been well settled that the manner or method of use of an apparatus cannot be relied upon to further limit claims to the apparatus itself. See *In re Casey*, 152 USPQ 235, and MPEP 2114.

Regarding claim 15, Teitel (see fig. 3, abstract and col. 3, lines 25-31) teaches a method of recharging hydrogen within a fuel cell comprising storing hydrogen gas in an accumulator, heating (col. 10, lines 25-31 and 48-57) heating a connected hydride storage container to evacuate and cooling the container to cause the stored hydrogen gas to improve the transfer of hydrogen from the accumulator to the hydride storage vessel. The hydrogen gas is then (rapidly) transferred from the accumulator to the connected hydride storage container by opening a valve.

Thus, Teitel fails to teach hydrolyzing liquid water to produce hydrogen gas, drying the hydrogen gas and storing the hydrogen gas thus produced.

Appleby teaches (see abstract, figure 1, col. 6, lines 4-30 and col. 7, lines 52-61) a method for producing hydrogen that includes an electrolyzer (50) for producing hydrogen and oxygen from water with the electrolyzer connected to a water supply (48) for on-board formation of hydrogen. The hydrogen gas is then passed through a dryer (liquid water trap 86) to remove any water and then the hydrogen is passed into an accumulator (52) for storage.

Therefore, it would have been obvious to one of ordinary skill in the art to have made the hydrogen gas by the production method of Appleby for the recharging method of Teitel because the hydrogen production method of Appleby provides a clean, dry and continuous source of hydrogen from only water, which would increase the safety of the method of Teitel due to storing hydrogen on-board as water and not in the microcapsules (94).

[Assuming *arguendo* that the limitation from the specification that the "evacuating" step is really a purification step to remove impurities from the metal hydride, such limitation would not be patentable as such a process step was known in the prior art as shown by Billings at col. 5, lines 39-44 and 54-58. However, as limitations from the specification are not read into the claims, the claim language of claim 15 only requires "evacuating" the metal hydride reservoir "by applying heat". The process of heating the metal hydride to release the stored hydrogen gas is interpreted to mean that the container is evacuated of hydrogen, thus meeting the claim language

of claim 15. Claim 15 does not say *what* is evacuated from the container, and thus reads on removing anything from the reservoir.]

Regarding claim 17, Teitel teaches (see abstract) storing the hydrogen in a metal hydride.

Regarding claim 19, Appleby teaches (see col. 6, lines 13-15) a vent (port 54) for venting oxygen to the atmosphere. Therefore, it would have been obvious to one of ordinary skill in the art to have added an oxygen vent as taught by Appleby for venting oxygen to the atmosphere, thereby avoiding dangerous accumulation of oxygen gas.

Regarding claim 20, it would have been within the expected skill of a routineer in the art to have measured the amount of hydrogen transferred because that would allow the operator to know how much hydrogen had been transferred allowing for more accurate calculation of data, i.e.-amount absorbed by metal hydride, amount discharged by metal hydride, total efficiency of system based on consumption of hydrogen, etc.

5. Claims 7 and 10-13 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teitel (US 4,211,537) in view of Appleby (US 5,813,222) as applied to claims 1-6, 8 and 9 above, and further in view of Teitel (US 4,302,217).

As recited above, Teitel '537 in view of Appleby teach a system including a fuel cell metal hydride storage reservoir, a water supply connected to an electrolyzer for converting water to hydrogen and oxygen, hydrogen storage means including an accumulator, a dryer for drying the hydrogen, and a heat exchanger to heat and cool the reservoir.

Teitel '537 in view of Appleby do not teach a compressor attached to the accumulator.

Regarding claims 7 and 10, Teitel '217 teaches (see col. 12, lines 8-15) that by adding a compressor to increase the pressure of the hydrogen gas in a fuel cell metal hydride storage reservoir, the rate of absorption of hydrogen can be increased. Therefore, it would have been obvious to one of ordinary skill in the art to have added a compressor to the system of Teitel '537 in view of Appleby because the compressor would allow for an increased rate of hydrogen absorption. Regarding the limitation that the stored hydrogen gas is "rapidly transferred from the accumulator to the hydride storage reservoir", this is a method limitation. The above limitation is not further limiting on the apparatus claim because the above limitation deals with the manner or method of use of the claimed apparatus. It has been well settled that the manner or method of use of an apparatus cannot be relied upon to further limit claims to the apparatus itself. See *In re Casey*, 152 USPQ 235, and MPEP 2114.

Regarding claim 11, Appleby teaches (see col. 6, lines 13-15) a vent (port 54) for venting oxygen to the atmosphere. Therefore, it would have been obvious to one of ordinary skill in the art to have added an oxygen vent as taught by Appleby for venting oxygen to the atmosphere, thereby avoiding dangerous accumulation of oxygen gas. Appleby teaches that the vent is located on the water reservoir, not the electrolyzer. However, it would have been within the expected skill of a routineer in the art to have located the oxygen vent on the electrolyzer instead of the water reservoir. See MPEP

2144.04. VI. C. Shifting the position of the vent would not affect the operation of the system.

Regarding claim 12, it would have been within the expected skill of a routineer in the art to have added means for measuring the amount of hydrogen transferred because that would allow the operator to know how much hydrogen had been transferred allowing for more accurate calculation of data, i.e.-amount absorbed by metal hydride, amount discharged by metal hydride, total efficiency of system based on consumption of hydrogen, etc.

Regarding claim 13, it would have been within the expected skill of a routineer in the art to have added a vacuum pump to evacuate the reservoir to ensure that all of the gas in the reservoir had been removed.

6. Claims 16 and 21 are rejected under 35 U.S.C. 103(a) as being unpatentable over Teitel (US 4,211,537) in view of Appleby (US 5,813,222) as applied to claim 15 above, and further in view of Billings (US 4,108,605).

The teachings of Teitel in view of Appleby are described above. Teitel teaches (see col. 10, lines 48-57) that a valve 148 is opened to (rapidly) transfer the hydrogen from the accumulator to the hydride storage container after the hydride container is cooled by the heat exchanger.

However, Teitel does not teach that a heating step is performed *for purification*.

Billings teaches (see col. 5, lines 39-44 and 54-58) that after successive adsorptions of hydrogen, impurities build up in metal hydrides that reduce the hydrogen

adsorption ability, but that by applying a heating step at a "sufficiently high temperature", the material is purged of the impurities.

Therefore, it would have been obvious to one of ordinary skill in the art to have applied heating *for purification* in the process of Teitel in order to remove any impurities adsorbed into the hydride alloy to avoid reductions in hydrogen adsorption ability.

Regarding claim 16, Teitel teaches (see col. 10, lines 48-57) detecting the pressure drop in the hydride storage tank to find out when the hydrogen needs to be replenished. This step would occur before applying a purification heating as taught by Billings.

Response to Arguments

7. Applicant's arguments filed 29 July 2004 have been fully considered but they are not persuasive. Applicant argued that:

- a. With respect to claims 1 and 14, Teitel in view of Appleby do not teach heating the reservoir for the purpose of evacuation.

In response, claims 1 and 14 are apparatus claims, and as such, the prior art must merely be capable of performing the claimed operation. The heat exchanger of Teitel has the capability to heat the reservoir. Thus, the prior art can function in the claimed manner. In addition, Applicant is apparently reading limitations from the specification into the claim language. The claim only requires evacuation by applying heat. It does not say *what* is evacuated. The desorption of hydrogen by applying heat is evacuation of the reservoir.

- b. There is no disclosure of rapidly transferring the gas from the accumulator to the hydride storage reservoir.

In response, Teitel discusses (see col. 10, lines 48-57) opening a valve to transfer the hydrogen from an accumulator to the hydride reservoir. Applicant discloses (see claim 21) that the rapid transfer may occur by opening a valve. Thus, Teitel meets the claim limitation of "rapid transfer".

- c. With respect to claim 15, Teitel in view of Appleby do not teach heating the reservoir for the purpose of evacuation.

In response, Applicant is apparently reading limitations from the specification into the claim language. The claim only requires evacuation by applying heat. It does not say *what* is evacuated. The desorption of hydrogen by applying heat is evacuation of the reservoir.

- d. Regarding claim 21, Teitel does not teach heating *for purification*.

In response, this argument was found persuasive. However, the step of heating hydride storage alloys for purification was well known in the art as evidenced by Billings.

- e. There is no motivation to combine the teaching of Teitel with Appleby.

In response, the Examiner has consistently pointed out the motivation to combine Teitel with Appleby throughout prosecution. Particularly that the apparatus/method from Appleby provides increased safety by avoiding storage of hydrogen gas while producing clean, dry hydrogen gas continuously. It is well within the knowledge of a layman, not even one of ordinary skill in the art, that storage of hydrogen gas is dangerous. One

nearly needs to look to history, such as the Hindenberg disaster, to know of the dangers of using hydrogen gas.

- f. Regarding claim 7, the additional limitation of a compressor is not taught by the prior art.

In response, see the above paragraph describing the disclosure in Teitel '217 for the teaching in the prior art of a compressor and the motivation to add it to the apparatus of Teitel '537 and Appleby.

Conclusion

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Harry D Wilkins, III whose telephone number is 571-272-1251. The examiner can normally be reached on M-Th 10:00am-8:30pm.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Roy V King can be reached on 571-272-1244. The fax phone number for the organization where this application or proceeding is assigned is 703-872-9306.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see <http://pair-direct.uspto.gov>. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free).

Harry D Wilkins, III
Examiner
Art Unit 1742

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